

CHEMISTRY FROM HARVARD.

Elementary Studies in Chemistry. By Joseph Torrey junr., Instructor in Harvard University. Pp. viii + 487. (Westminster: Archibald Constable and Co., Ltd. 1900.)

THIS book is written with an evident desire to present elementary chemistry in such a way as to give full effect to its educational capabilities without neglecting other ends and without a sacrifice of those external features of interest which in the past have covered such a multitude of sins. Mr. Torrey has, in fact, had but one aim, and that to make the best of his subject. A spirit of entire forgetfulness of examiners and syllabuses pervades the work, and things and theories are dealt with according to their intrinsic importance. To say so much is to say a great deal in favour of the book, and to this it must yet be added that the author writes like a practised and enlightened teacher. English teachers of chemistry, both in secondary schools and colleges, will do well to look at Mr. Torrey's book, if only to see the sort of thing that is put forward from Harvard as a suitable course of elementary chemistry. It must be remarked, however, that the course is not intended for quite the same class of pupil that in this country has in recent years been supplied with reformed courses of elementary science. Mr. Torrey's course seems intended for the later stages of the secondary school or for beginners in a college.

To point out the essential difference of plan between teaching chemistry in a stimulating way and teaching it in a deadening way would be to repeat what has often been said before in these columns. It is becoming the habit to summarise these two plans in the words heuristic and didactic, and these philosophical terms have acquired something of the character of verbal missiles, to be hurled by contending parties as weapons of offence.

Two main contentions are heard against the feasibility of improved methods of science teaching. The first is to the effect that a certain proportion of youth have a natural repugnance to science, even in its most inviting form. They refuse to be interested, they will not find out; therefore they must be told things and made to listen and repeat. It seems very doubtful whether this allegation does not very frequently arise from an injudicious or a too impatient teacher, or from one who has the misfortune to deal with good material already spoiled by bad treatment. Where it is wholly true the reply would be, let such pupils be tried with some other subject. If the same resistance continues to be shown, we surely are dealing with something akin to the deficient or feeble-minded class for which at last some separate treatment must be provided. It seems an unfortunate conclusion to reach, that because a good method does not appeal to all, it should be alloyed with an inferior one for the sake of a few.

The second contention is that a good course of science teaching presents difficulties from the examinational standpoint. This is, unfortunately, only too true. It is, undoubtedly, a great practical obstacle, and its removal can only be looked for when further abatement has taken place in the rigour of the whole examinational system,

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which holds so many good teachers of all subjects in its paralysing grasp.

It is difficult to give in narrow limits an indication of the sequence and style of Mr. Torrey's course. The book is written in the form of short lectures of a suggestive kind, followed by indications of the laboratory work to be done in connection with, or consequent upon, the lectures. It begins with physical topics, including certain measurements, thermometry, vapour pressure and density of gases. The chemistry begins with hydrogen and the composition of water, which is to be studied quantitatively; the composition of hydrogen chloride is then dealt with, in order to accumulate enough material for a discussion of Avogadro's theory. Then follow oxidation, symbols and formulae, determination of atomic weights, acids, bases and salts, electrolysis and electrolytic dissociation, sodium as a metallic element and its chief compounds, the sodium group of metals, the atmosphere, ammonia, nitric acid, the nitrogen family, the sulphur family, the calcium group, &c., ending with carbon and its inorganic compounds. In an appendix we find hints on the manipulation of glass, a list of apparatus required, a list of books for a teacher's library, a few numerical tables and two pages of logarithms.

It would not be difficult to find fault with the order of topics, and the chief objection would perhaps be to the early introduction of the theory of atoms and molecules and other theoretical matters. Mr. Torrey's order is probably not so good as some which have been elaborated in this country, but the method of the book in detail is so good that some faults of arrangement may be allowed to pass, and besides this it must be remembered that the book is not intended for children.

It is possible that on working through the book some faults of detail would be discovered. Many of the experiments described are novel in form, and some seem hardly likely to succeed. For example, on p. 98 an experiment is described, in which manganese dioxide is to be heated in a tube containing hydrogen chloride. The shrinkage of volume on opening the tube below a saturated solution of brine is said to represent the hydrogen which has disappeared. This is obviously wrong, and, practically speaking, the experiment is altogether an undesirable one.

In conclusion, it may be remarked that the book is unusually free from words or pedantries peculiar to America. An exception to this statement occurs on p. 7, where there is a reference to "the graduate being held in front of a dark surface to make the lines show more clearly." The graduate there means a glass vessel and not the careworn teacher.

A. SMITHELLS.

A NEW EDITION OF WHITE'S "SELBORNE."

The Natural History and Antiquities of Selborne, and a Garden Calendar. By the Rev. Gilbert White, M.A. Edited by R. Bowdler Sharpe, LL.D. Two vols. (London: S. T. Freemantle, 1900.)

IT will be as well to state exactly what is contained in these handsome but rather bulky volumes; the price is high (3*l.*), and purchasers will be glad to know what they are buying. In the first volume are the letters to

Pennant, *i.e.* the first part of the "Natural History of Selborne," freely interpolated with bracketed addenda from the originals in the British Museum, and including three or four letters of which White did not make use in preparing his book for the press. Then, pleasantly introduced by Dean Hole, and occupying more than 200 pages, come White's garden diaries from 1751 to 1771; of which a specimen, and enough to give an idea of White's personal activity as a gardener, was printed as an appendix to Bell's edition of the "Selborne" in 1877. The second volume contains the letters to Barrington, also with additions and interpolations from the originals, except in the case of the famous "monographies" of the *Hirundinidae*, which were published separately by White in the *Philosophical Transactions*; the antiquities of Selborne are also here, and at the end we find a bibliography and a useful index, which appear to be sufficiently complete. Each volume is profusely illustrated. Mr. Keulemanns' drawings of birds are familiar and welcome; we have also a large number of fancy sketches by Mr. E. Sullivan, in most of which an imaginary Gilbert White is a prominent figure. Mr. Herbert Railton's head- and tail-pieces are, for the most part, delicate and attractive. As regards the notes, Dr. Sharpe's name is, of course, a sufficient guarantee of the soundness of those on birds, and the only fault to be found with them is that they are occasionally a little wanting in succinctness and self-repression. Several of Dr. Sharpe's colleagues at the British Museum have provided him with useful notes relating to their departments of natural history, and a judicious selection has been made from the notes of previous editors, especially Bell and Harting.

From what has been said above, it will be seen that this is not really an edition of the book that White so carefully wrought into an artistic form, and that we all know and love. It is not pleasant to say it, but said it must be emphatically, that the liberties here taken with White's work have absolutely no literary justification, and have robbed it of much of that peculiar charm which, as Prof. Newton has well said in his admirable article on White in the "Dictionary of Biography," it is impossible to explain in words. What would have been White's own feelings if he had been forced to see in print the very portions of his letters which, with his own good sense and the respect of his age for publication, he had deliberately cut out, and the insertion of two hundred pages of his gardening notes between the letters to Pennant and those to Barrington? If it be argued that (as Dr. Sharpe seems to think) we learn something new about White himself by getting an idea of the original form of his letters and of the way in which he wrought his book out of them, the plain answer is that we already know all that is essential about him, and that one thing we know for certain is that he had a sense of literary form which has made his book immortal, and which should have secured for it more reverential handling than is to be found in these volumes. It might, indeed, be possibly justifiable to print the whole of the original letters as they left his hand; but not as an edition of the "Natural History of Selborne," which should always be allowed to stand exactly as his genius designed it. It will be the duty of future editors to see that none of the passages now interpolated are

allowed to creep permanently into the text of the original work.

Dr. Sharpe's enthusiasm for his author is unquestionable, as may be seen from his brief but pleasant introduction to the first volume; so, too, is the labour that he has spent on his editorial task. But the perils of the editor of a classic are great, and enthusiasm alone will not teach him how to avoid them.

OUR BOOK SHELF.

The Romance of the Heavens. By A. W. Bickerton. Pp. 284. (London: Swan Sonnenschein and Co., Ltd., 1901.) 5s.

THE theory of constructive impact, of which a popular account is given in the present book, appears to have had its origin in an attempt to explain the phenomena of new stars by the grazing collision of two dark bodies. Hitherto the theory has not been hospitably received by astronomers, and the more elaborate exposition now presented will probably meet no better fate. The truth seems to be that in spite of his claim to have discovered numerous facts not known to "ordinary" astronomers, the author lacks familiarity with spectroscopic work and astronomical methods generally. He quite condemns himself by suggesting (p. 235) that more confirmatory evidence in the case of Nova Aurigæ was only wanting because astronomers, unguided by the theory, did not make "more liberal and careful observation." As a matter of fact, the most valuable records were photographic, and are still as much in evidence as during the visibility of the Nova, and the observations certainly cannot be interpreted as indicating the presence of three bodies of the kind required by the theory. The theory thus breaks down at the outset, and it would not be difficult to show the weakness of most of the "overwhelming" astronomical evidence on which depends its extension into collisions of nebulae, clusters and cosmic systems by which it is argued that the existing forms and distribution of celestial bodies are completely explained. The merest possibilities are frequently magnified into certainties, as, for example, the occurrence of variable stars in pairs, and the preponderance of variability in double stars.

The resources of the theory appear to be unlimited. While one collision produces a new star, another results in a star cluster, another blows a planet into asteroids, and still another disperses a satellite into a ring such as that of Saturn.

We have not examined all the calculations which are given, but we may point out that the results arrived at for the separation of two stars of assumed distance and velocity (p. 58) are in each case six times too great.

The book is admirably written and is by no means without interest; but readers should be warned against mistaking the author's assertions for demonstrated truths.

Les Diastases et leurs Applications. By E. Pozzi-Escot. Pp. 218. (Paris: Masson and Co., 1900.)

THIS little volume forms one of the series of Aide-Mémoire, some of which have been previously reviewed in this journal. Its modest preface disarms criticism. "Le lecteur ne devra pas chercher ici l'exposé de théories nouvelles; nous nous sommes contenté d'exposer les faits connus, de les relier l'un à l'autre et d'en tirer chaque fois qu'il y a eu lieu des conclusions légitimes." And further, "Forcément incomplet, nous espérons que notre travail (qui n'est point fait pour des biologistes, mais bien pour une collection destinée aux ingénieurs et aux chimistes), rendra néanmoins quelques services et